Solutions

Grade 9 Mathematics Pilot Achievement Test

2010

Use the following diagram to answer question 3.

The triangle *JKL* shown below undergoes the translation $(x, y) \rightarrow (x + 3, y - 2)$.

[handwritten] Move
x to the Right 3 units
y To the bottom -2 units
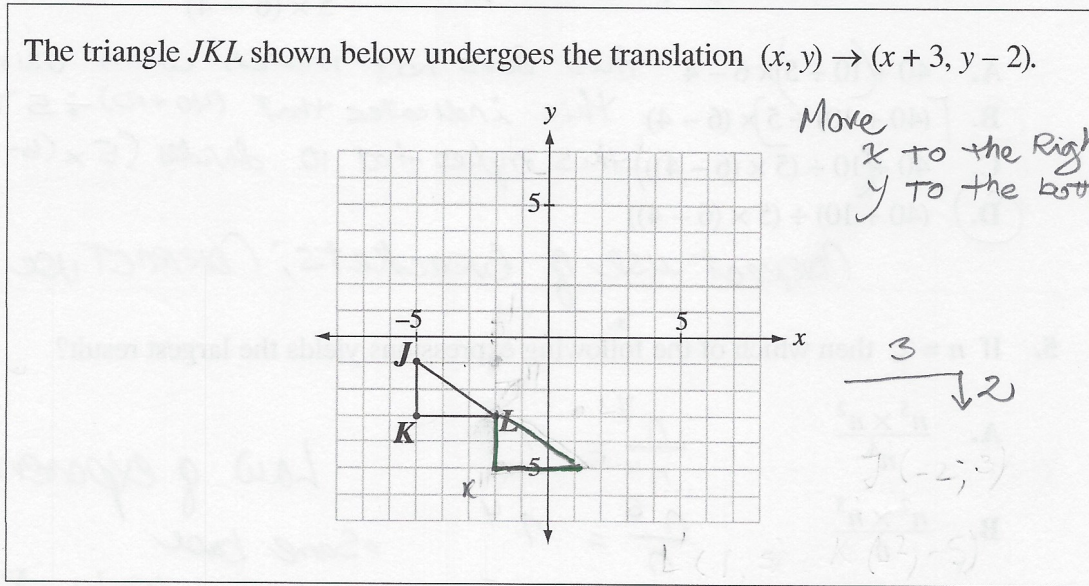
3. Which of the following rows represents the coordinates of the resulting image?

Row	J′	K′	L′
A.	$(-2, -3)$	$(-2, -5)$	$(-1, 5)$
B.	$(-2, -3)$	$(-2, -5)$	$(1, -5)$
C.	$(-8, -3)$	$(-8, -1)$	$(-5, 1)$
D.	$(-8, -3)$	$(-8, -1)$	$(5, -1)$

Use the following information to answer numerical-response question 1.

A piggy bank contains only quarters and nickels, and there is a total of 60 coins. The total value of the coins in the bank is \$7.40. *[handwritten]* q=0.25 n=0.05

Numerical Response

[handwritten] We know that → 60 coins = q + n
∘ From this, we know
$q = 60 - n$

1. How many quarters are in the piggy bank?

Answer: ___22___

[handwritten] ∘ then, \$7.40 = 0.25q + 0.05n nickels
7.40 = 0.25(60 - n) + 0.05n

(Record your answer in the numerical-response section on the answer sheet.)

[handwritten]
15 - 7.40 = 0.20n
$n = \dfrac{150 - 7.40}{0.20} = \dfrac{7.6}{0.2} = 38$
there are 38 nickels

$60 = q + n$ $q = 60 - n$
$7.40 = 0.25q + 0.05n$
$7.40 = 0.25(60 - n) + 0.05n$
$7.40 = 15 - 0.25n + 0.05n$
$7.40 = 15 - 0.20n$ $0.20n = 15 - 7.40$ $n = \dfrac{7.6}{0.2}$

↳ then, 22 quarters

8. Which of the following number lines represents the solution to the inequality
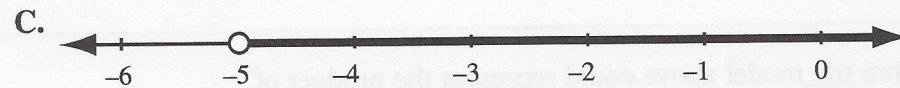$5x - 3 \leq 7x + 7$?

(handwritten) $5x - 3 \leq 7x + 7$ $-3 - 7 \leq 7x - 5x$

$-10 \leq 2x$

$\boxed{-5 \leq x}$

$\boxed{x \geq -5}$

A.

(handwritten) $x < 5$

B.

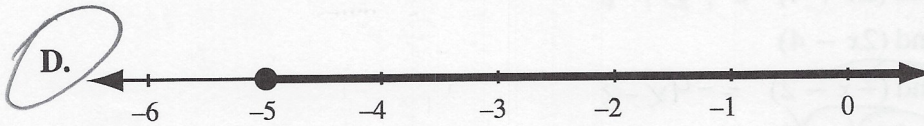*(handwritten)* $x \leq -5$

C.

(handwritten) $x > -5$

D. *(circled)*
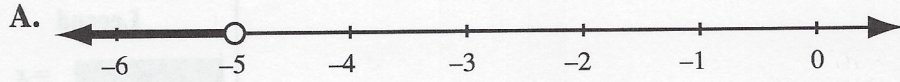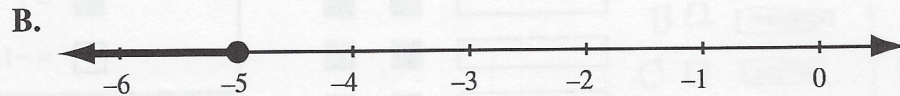
(handwritten) $x \geq -5$

Use the following information to answer numerical-response question 2.

The diagram below shows a circular pipe that has O as its centre. The radius of
the pipe is 20 cm.

(handwritten annotations)

$h = \sqrt{20^2 - 16^2}$

$= \sqrt{400 - 256}$

$= \sqrt{144}$

$\boxed{h = 12}$

20 cm

O equal

h 16

32 cm

Maximum height

Water level
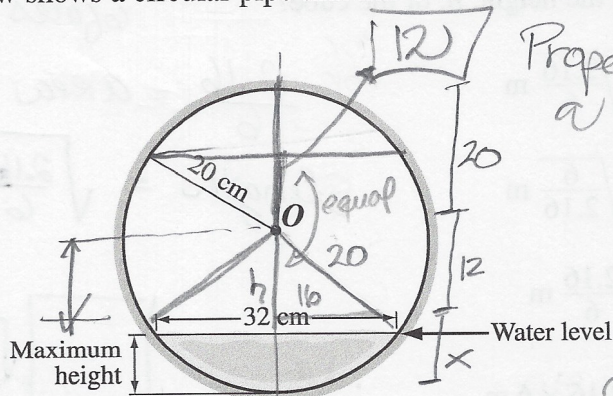
$\boxed{12}$ Properties of a chord

20

20

12

x

chords goes through the middle

Numerical Response

2. The maximum depth of the water in the pipe is ___8___ cm.

(Record your answer in the numerical-response section on the answer sheet.)

(handwritten) Since the diameter is 40 → height is $20 + 12 = 32$

$x = 40 - 32 = 8$ cm

Use the following information to answer question 11.

An art store is having a sale. The table below shows the regular price, *r*, and the sale price, *s*, of several items.

Item	Regular Price (*r*)	Sale Price (*s*)
Glue	$5.00	$4.25
Brushes	$7.00	$5.95
Paper	$10.00	$8.50
Crayons	$12.00	$10.20

11.   Which of the following equations was used to calculate the sale prices?

   A. $s = 0.15r$

   B. $s = 0.85r$

   C. $s = r - 0.75$

   D. $s = r - 0.85$

Handwritten work:
$5.00 \quad 100\%$
$4.25 \quad x$
$x = \dfrac{425}{5} = 85\%$
so, sale is $100\% - 85\% = 15\%$
Sale is 15%
so

Use the following diagram to answer numerical-response question 3.

Sam draws two polygons that are similar. The first polygon has a perimeter of 16 cm and the second polygon has a perimeter of 10 cm.

Numerical Response

3.   If the shortest side of the first polygon has a length of 4 cm, then the corresponding side of the second polygon has a length of ___2.5cm___ cm.

(Record your answer in the numerical-response section on the answer sheet.)

Handwritten work:
$\dfrac{16}{4} = \dfrac{10}{x}$
$\dfrac{16}{10} = \dfrac{4}{x}$
$\dfrac{40}{16} = 2.5$
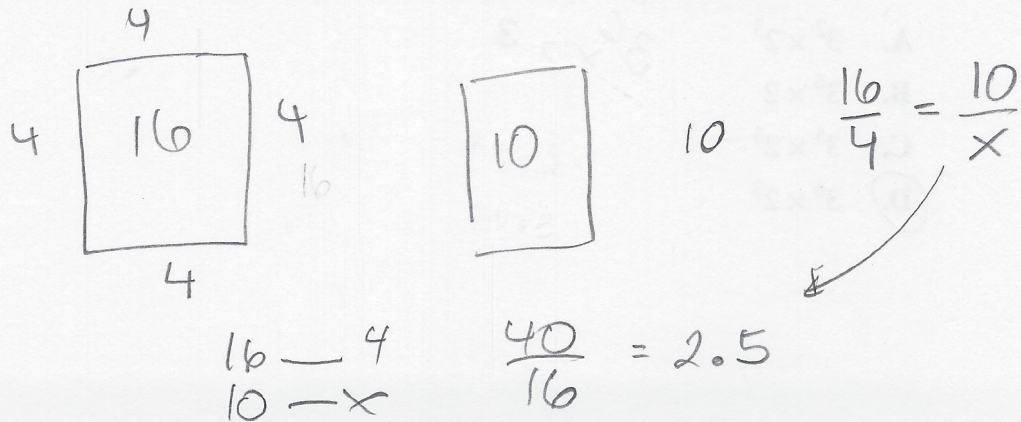
Use the following diagram to answer question 15.

A ladder with equally spaced rungs is shown below.
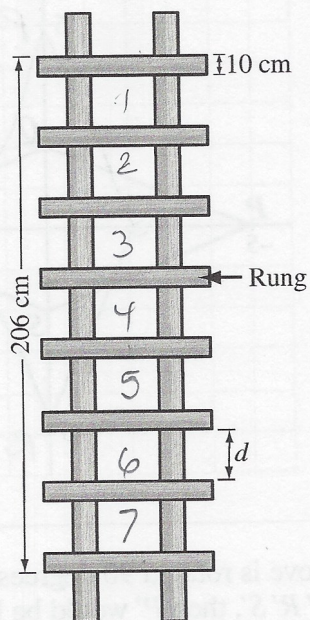
* *d* represents distance
between rungs

15. Which of the following equations can be used to calculate the distance, *d*, between each ladder rung?

A. $d = 206 - 8(10) \div 7$

B. $d = 206 - 8(10) \times 7$

C. $d = \dfrac{7}{206 - 8(10)}$
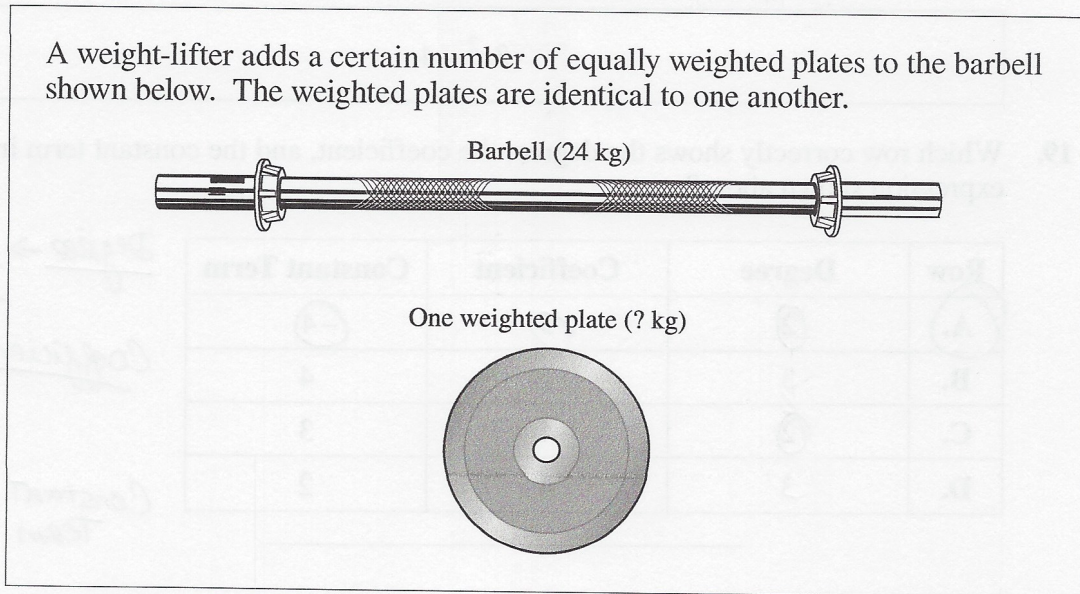
D. $d = \dfrac{206 - 8(10)}{7}$

$206 = 7d + 8(10\ cm)$

$206\ cm = 7d + 80\ cm$

$206\ cm - 80\ cm = 7d$

$\dfrac{206 - 80}{7} = d$

13

A weight-lifter adds a certain number of equally weighted plates to the barbell shown below. The weighted plates are identical to one another.

Barbell (24 kg)

One weighted plate (? kg)

17. If the total mass of the barbell and plates equals 60 kg, and if each side of the barbell has the same number of plates, then one weighted plate could have a mass of

A. 36 kg → 1 plate

B. 12 kg → 3 plates (not even) 24 kg + ? = 60 kg   ∘ 36 kg among weighted plates in both sides

C. 6 kg   ? = 60 − 24 = 36

D. 4 kg → 9 plates (not even)

$\frac{36}{6} = 6$ → 3 on each side

18. Marc has a certain number of coins that are dimes, *d*, and quarters, *q*. Which of the following expressions represents the value of Marc's money in cents?
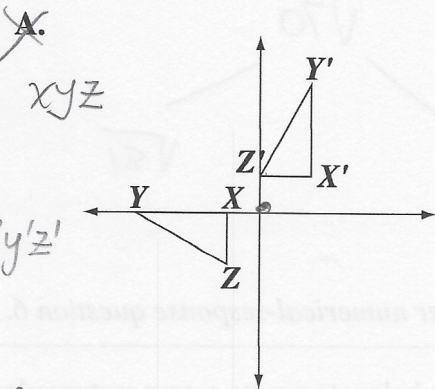
A. $10d + 25q$ Money = d + q   1d = 10c

B. $35(d + q)$ Money = 10d + 25q   1q = 25c

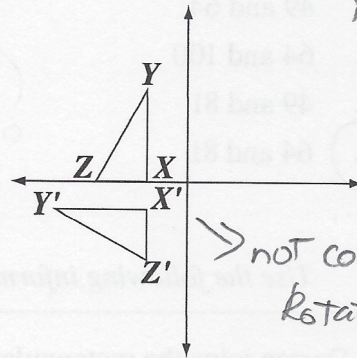C. $35d + q$

D. $d + q$

counterclockwise (handwritten, with arrow)

20. Which of the following diagrams illustrates a 90° rotation of triangle *XYZ* counter-clockwise about the origin?

Original Coordinates → XYZ (handwritten)

new coordinates → X'Y'Z' (handwritten)

A. (circled)

90° → ends up in following quadrant. (handwritten)

B.

180° = across quadrant (handwritten)

not correct Rotation (handwritten)

C. (circled)

counter clockwise (handwritten)
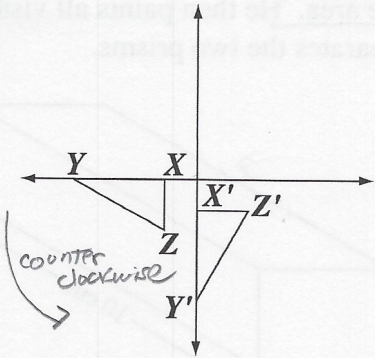
D.
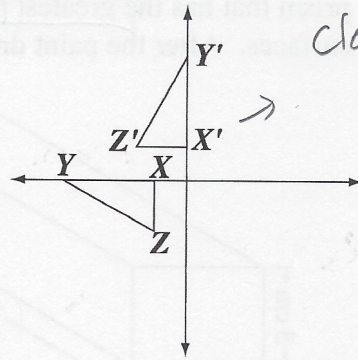
Clockwise Rotation (handwritten)

21. When $x^2 - 9x - 4$ is subtracted from the sum of $5x^2 - 8x + 2$ and $2x^2 - 3x - 7$, the result is

A. $x^2 - 20x - 9$

B. $2x^2 + 4x + 13$

C. $6x^2 - 2x - 1$ (circled)

D. $8x^2 - 20x - 9$

Handwritten work:
$$5x^2 - 8x + 2 \quad +$$
$$2x^2 - 3x - 7$$
$$\overline{7x^2 - 11x - 5}$$

Subtract → add the opposite (handwritten)

$$7x^2 - 11x - 5 \quad +$$
$$-x^2 + 9x + 4$$
$$\overline{\boxed{-6x^2 - 2x - 1}}$$

The following diagram represents a balanced mobile.
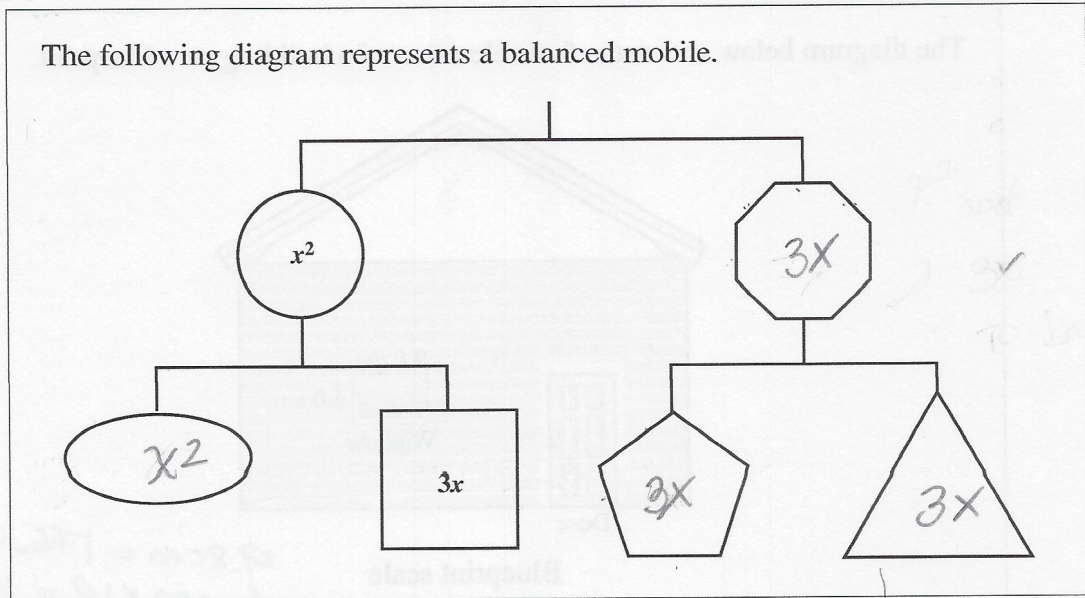
23. The sum of all parts of the mobile is   *non-poligons = x^2*
    poligons = $3x$

    A. $2x^2 + 12x$

    B. $2x^2 + 9x$

    C. $x^2 + 6x$ $2x^2 + 12x$

    D. $x^2 + 3x$

Use the following equation to answer question 24.

$$2.15x + 7.8 = 25$$

24. Which of the following equations is equivalent to the equation shown above?

    A. $215x + 780 = 2\,500$ $215x + 780 = 2500$

    B. $215x + 780 = 250$

    C. $215x + 78 = 2\,500$

    D. $215x + 78 = 25$

Use the following information to answer question 27.

Jim simplifies the expression $\dfrac{5(x+2)-(8-x)}{2}$ as shown below.

Step 1	$\dfrac{5x+10-8-x}{2}$ → $+x$
Step 2	$\dfrac{4x+2}{2}$
Step 3	$\dfrac{4x}{2}+\dfrac{2}{2}$
Step 4	$2x+1$

27. In which step did Jim make an error when simplifying the expression?

A. Step 1

B. Step 2

C. Step 3

D. Step 4

28. Tim buys 2 kg of almonds at \$5.49/kg and 4 kg of cashews at a store that includes GST in its prices. If the cost of his purchase is \$25.50, then the price of 1 kg of cashews is

A. \$3.63

B. \$7.26

C. \$10.98

D. \$14.52

2 kg × \$5.49/kg = \$10.98

4 kg

\$25.50 = \$10.98 + \$(4kg)

\$(4kg) = \$25.50 − \$10.98

\$(4kg) = \$14.52

Price per kilo = $\dfrac{\$14.52}{4}$

21

Use the following information to answer question 31.

Ben was earning a monthly salary of $5 000 before he changed jobs. At his new job he earns 10% less than he did at his old job.

31. If after one year at his new job Ben receives a pay increase of 15%, how much will he then be earning per month?

   A. $4 725
   B. $4 750
   C. $5 175
   D. $5 250

Handwritten work:
10% = 500
New salary = $5000 – $500
= $4500

$4500 — 100%
X — 15%   X = $675 increase

total new = 4500 + 675 = $5175

32. Jenny notices that a music store is having a "No GST and 40% off the regular price" sale. If the regular price of a CD is $15.99, then what is the maximum number of sale-priced CDs that Jenny can buy with her $80 gift card?

   A. 8
   B. 9
   C. 11
   D. 13

Handwritten work:
$15.99 — 100% $ = 6.396
X — 40%
Discounted price = $15.99 - 6.396
$9.594

$80 / $9.594 = 8.33
↳ 8

Numerical Response

8. At a picnic for 49 people, 4 families each brought an equal number of lawn chairs. If 5 more lawn chairs were still needed, then how many chairs did each family bring?

Answer: 11 chairs

(Record your answer in the numerical-response section on the answer sheet.)

Handwritten work:
49 = 4X + 5
49 – 5 = 4x → 44 = 4X
X = 44/4 = 11 chairs

24

Use the following information to answer numerical-response question 9.
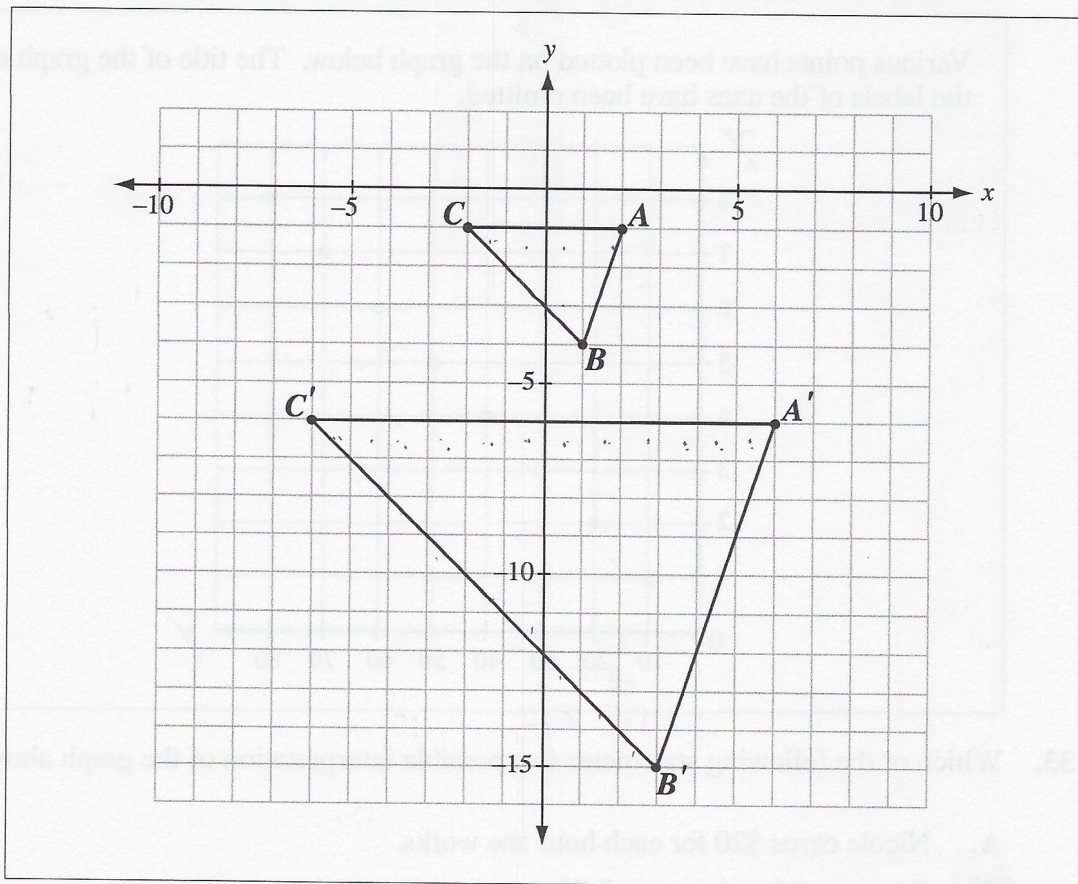
Numerical Response

$$\frac{C'A'}{CA} = \frac{12}{4} = 3$$

9. What is the scale factor of the enlargement?

Answer: ___3___

(Record your answer in the numerical-response section on the answer sheet.)

25

In a science experiment, a solution has an initial temperature of 20 °C, as shown below.

Thermometer

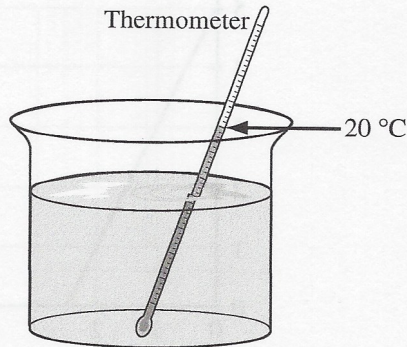— 20 °C

35. If the temperature, *T*, of the solution drops 2.8 °C/h, then which of the following equations can be used to calculate the temperature of the solution after 4 hours?

A. $T = 20\ °C - (2.8\ °C/h \times 4\ h)$

B. $T = 20\ °C + (2.8\ °C/h \times 4\ h)$

C. $T = (20\ °C - 2.8\ °C/h) \times 4\ h$

D. $T = (20\ °C + 2.8\ °C/h) \times 4\ h$

Initial = 20 °C
temperature decrease
increase

Use the following information to answer numerical-response question 10.

A person who is 200 cm tall casts a shadow that is 40 cm long. At the same time of day, a nearby post casts a shadow that is 16 cm long.

Numerical Response

10. The height of the post is _____80_____ cm.

(Record your answer in the numerical-response section on the answer sheet.)

200

40

27

80

16

$\dfrac{16}{40} = 0.4$ Scale factor

70°

$60 + 70 + 50 = 180$

$x = 180 - 60 - 50$

$= 180 - 110$

$= 70°$
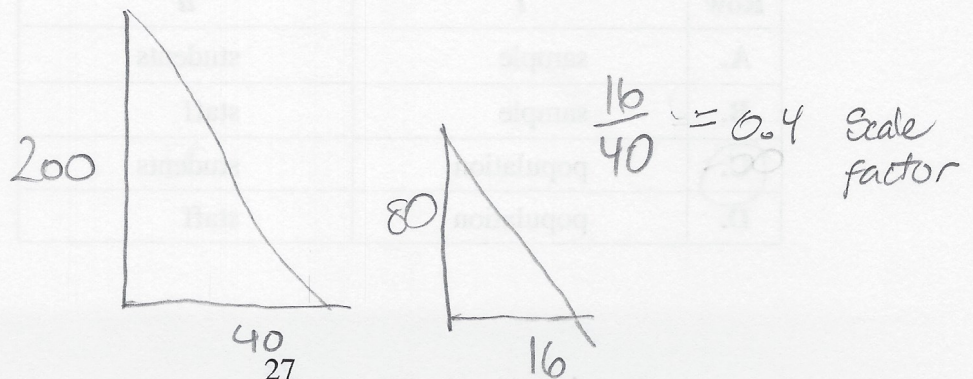
38.   The measure of *x* in the diagram above is

   A.   50°
   B.   60°
   C.   65°
   D.   70°

Additional Information

The table below provides additional information about 49 of the 50 items that appeared on the 2010 Grade 9 Pilot Mathematics Achievement Test.

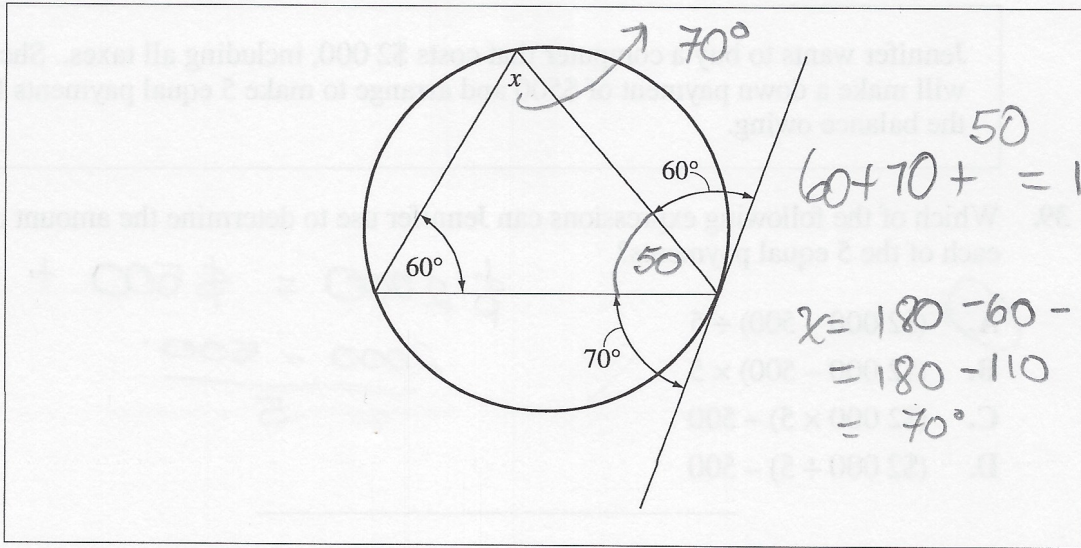| Item	Key	Correct Response %	Item Complexity	Strand	Specific Outcome	Item Description
MC 1	C	85.1	L	N	6	Determine the approximate square root of a rational number that is not a perfect square.
MC 2	B	18.2	M	PR	3	Represent a word problem as a single-variable linear equation.
MC 3	B	71.1	L	SS	5	Determine the resulting coordinates of an image that undergoes a translation on the Cartesian plane.
MC 4	D	43.2	M	N	4	Apply knowledge of order of operations to determine which expressions are equivalent.
MC 5	D	71.0	M	N	2	Perform operations on expressions containing powers with integral bases and whole number exponents.
MC 6	A	38.3	M	PR	4	Solve a single-variable linear inequality with rational coefficients.
MC 7	C	69.8	L	N	2	Determine the sum, difference, product, and quotient of given powers with integral bases and whole number exponents.
MC 8	D	42.5	H	PR	4	Solve a single-variable linear inequality with rational coefficients and represent the solution on a number line.
MC 9	D	65.3	M	PR	7	Represent the product of a monomial and a binomial with an algebra tile model.
MC 10	A	47.5	M	SS	2	Determine the equation that represents the height of a rectangular prism when given the surface area of the prism.
MC 11	B	59.5	L	PR	1	Represent a pattern shown in a table of values as a single-variable linear equation.
MC 12	D	70.3	L	PR	4	Represent a given context as a single-variable linear inequality with a rational coefficient.
MC 13	B	50.0	M	SS	2	Determine the change in surface area of a rectangular prism after one of its dimensions is increased by a certain factor.
MC 14	D	53.2	L	N	2	Simplify a two-term expression contained within parentheses by applying the exponent laws of powers with integral bases and whole number exponents.
MC 15	D	48.9	H	N	4	Determine the equation that represents the solution to a word problem involving the order of operations.

Item	Key	Correct Response %	Item Complexity	Strand	Specific Outcome	Item Description
MC 32	A	57.2	M	N	4	Solve a word problem by applying knowledge of order of operations on rational numbers expressed as percentages.
MC 33	C	89.0	H	SP	3	Identify the statement that represents a possible interpretation for a given graph.
MC 35	A	67.0	M	PR	2	Represent the solution to a given problem with a linear equation.
MC 36	A	53.4	M	PR	2	Match a given linear equation to its corresponding graph.
MC 37	C	79.0	M	SP	2	Determine whether or not a sample of a population or a population was used to answer a question and how that decision may have influenced the results.
MC 38	D	55.4	L	SS	1	Use properties of circles to determine the measure of an angle in a triangle that is inscribed in a circle.
MC 39	A	68.4	M	N	4	Determine the expression that represents the solution to a word problem involving order of operations.
MC 40	D	66.8	M	N	3	Solve a word problem involving arithmetic operations on rational numbers.
NR 1	22	38.5	H	PR	3	Represent and solve a given money problem using a linear equation.
NR 2	8	44.4	H	SS	1	Solve a problem involving a circle property whereby the perpendicular from the centre of a circle to a chord bisects the chord.
NR 3	2.5	51.2	M	SS	3	Use the properties of similar polygons to solve a word problem.
NR 4	64	16.1	M	SS	3	Solve a word problem involving perimeter and area of similar polygons.
NR 5	35	71.2	L	SS	1	Solve a problem involving a circle property whereby the measure of the central angle is equal to twice the measure of the inscribed angle subtended by the same arc.
NR 6	24	20.0	H	SS	2	Create a composite 3-D object with the largest surface area possible by joining together two identical 3-D objects and find the shared area that is common to both 3-D objects.
NR 7	85	37.6	H	PR	3	Represent and solve a given problem using single-variable linear equations.
NR 8	11	74.0	M	PR	4	Represent and solve a given problem using a single-variable linear equation.
NR 9	3	63.1	L	SS	4	Determine the scale factor used to create an image of a 2-D shape on the Cartesian plane.
NR 10	80	66.2	M	SS	4	Use the properties of similar triangles to solve a word problem.